ORDER NO.PHAMOS0601005A1
E1

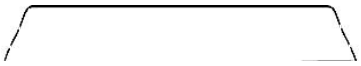
Service Manual

Microwave Oven

NN-SD986S / NN-H965WFB

APH(USA)

Please file and use this specified manual together with the service manual for Model NN-T695 (ORDER NO. PHAMOS0501001C1).



SPECIFICATIONS

Specifications:

Model / Specifications	[illegible]	[illegible]
Power Source:	120V AC Single Phase 60 Hz	
Power Requirement:	[illegible]	[illegible]
Output:	1250W	1250W
Microwave Frequency:	2450MHz	
Timer	[illegible]	
Oven's Dimensions:	[illegible]	
Oven Cavity Dimensions:	[illegible]	
Oven Carton Dimensions:	[illegible]	
Weight:	[illegible]	
PVC	This product with PVC	
Specifications subject to change without notice.		

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⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

WARNING

1. This product should be serviced only by trained, qualified personnel.
2. Though this product has been manufactured in compliance with:
   "Federal Performance Standard 21 CFR Subchapter J"(D.H.H.S); U.S.A. models
   or "Radiation Emitting Devices Act"(Health and Welfare Canada); Canadian models
   it is very important all repairs should be made in accordance with procedures described in this manual to avoid being exposed to excessive microwave radiation.
3. Check for radiation leakage before and after every servicing according to the "procedure for measuring radiation leakage."
4. If the unit cannot be repaired on site, advise the customer not to use until unit is repaired.
5. Any serviceman who learns of any accident pertaining to microwave radiation leakage including the oven operating with open door should immediately notify the appropriate address listed below and Center for Devices and Radiological Health, DHHS.

IN U.S.A. (PASC)	Panasonic Services Company 50 Meadow and Parkway, Secaucus, New Jersey 07094 Attention: Technical Service Division (201)348-7000	IN PUERTO RICO (PSC)	PSC San Gabriel Industrial Park 65th Infantry Ave. Km 9.5 Carolina, Puerto Rico 00985 (787)750-4300
		IN CANADA (PCI)	Panasonic Canada Inc. 5770 Ambler Drive, Mississauga, Ontario, L4W2T3 (905)624-5010

6. There are special components used in the microwave oven which are important for safety. These parts are marked with a ⚠ on the replacement parts list. It is essential that these critical parts should be replaced only with the manufacturer's specified parts to prevent microwave leakage, shock, fire, or other hazards. Do not modify the original design.

PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

(A) Do not operate or allow the oven to be operated with the [illegible] inspection with in the microwave generating compartments.

DANGER OF HIGH VOLTAGE AND HIGH TEMPERATURE (HOT/LIVE) OF THE INVERTER POWER SUPPLY (U)

INVERTER WARNING

This Inverter board looks like a regular PCB. However, this PCB drives the magnetron tube with extremely high voltage and high current. NEW H.V.

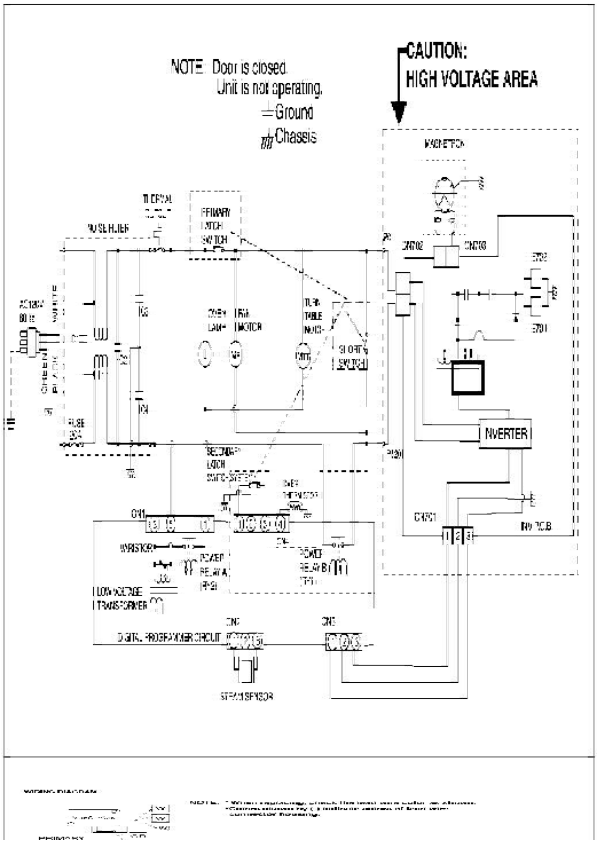
IT HAS:
1. Very high voltage and high current circuits.
   It functions the same as the high voltage transformer and high voltage capacitor in ordinary microwave ovens.
2. Aluminum heat sink that is energized with very high voltage and high heat energy.
3. Very high voltage which may remain in circuitry even when oven is off. High voltage charge may remain in the capacitors on the board.

DO NOT:

1. Do not touch circuitry because it has very hot (high voltage) circuitry. Even when replacing board, extreme care should be taken to avoid possible electric shock hazards. High voltage charge may remain in circuits.
2. Do not touch aluminum heat sink because it is energized with very high voltage and is also very hot in high heat energy.
3. Do not try to adjust or tamper with preset control on the Inverter board because it is very dangerous to adjust without proper test equipment.
4. Do not test oven while Inverter grounding plate or screws are loose. It is very dangerous to operate H.V. Inverter Circuit (U) with loose mounting screws or if improperly grounded.
5. For USA only:
   Do not try to repair Inverter PCB because it is very dangerous to repair. Replace as a complete High Voltage Inverter Circuit unit and return fully re-packed in original shipping box and shipping materials.

INVERTER POWER SUPPLY

1. SCHEMATIC DIAGRAM



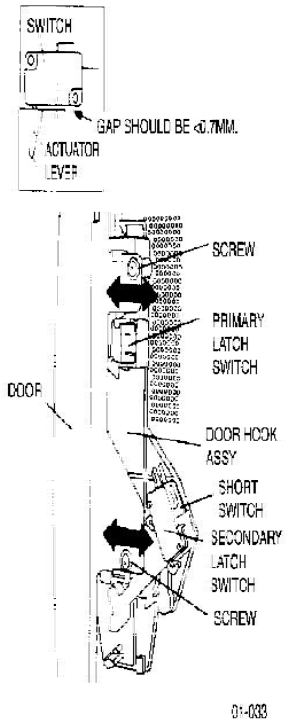
2. MEASUREMENTS AND ADJUSTMENTS

WARNING

- For continued protection against radiation hazard, replace only with identical replacement parts (For touch models part No. J61424T00AP, Type No. V-15G-3C25 for primary latch switch: Part No. J61414T00AP, Type No. D3V-16G-3C25 for Secondary latch switch and Part No. J61784T00AP, Type No. D3V-1G-2C23 for short switch.)
- When the 20 A mp. fuse is blown due to the operation of the short switch, you must replace power relay B (part No. AEBGJQC25F18, Type No.G5G-1A18VDC). Primary latch switch and the short switch. Then follow the installation procedures below.
- Interlock switch replacement In replacing faulty switches, be sure mounting tabs are not bent, broken or otherwise deficient in their ability to hold the switches.
- Refer to schematic diagram to ensure proper connection.

2.1. Adjustment of primary latch switch, secondary latch switch and short switch.

1. **Mount the Primary latch switch, the Secondary latch switch and the short switch to the door hook assembly as shown in ILL.**
   NOTE:
   No specific individual adjustments during installation of the Primary latch switch, Secondary latch switch or Short switch to the door hook are required.
2. **When mounting the door hook assembly to the oven assembly, adjust the door hook assembly by moving it in the direction of the arrows in the illustration so that the oven door will not have any play in it. Check for play in the door by pulling the door assembly. Make sure that the latch keys move smoothly after adjustment is completed. Completely tighten the screws holding the door hook assembly to the oven assembly.**
3. **Reconnect the short switch and check the continuity of the monitor circuit and all latch switches again by following the component test procedures.**



2.2. Measurement of microwave output

The output power of the magnetron can be determined by performing IEC standard test procedures. However,due to the complexity of IEC test procedures, it is recommended to test the magnetron using the simple method outlined below.

Necessary Equipment:

***1 liter beaker *Glass thermometer / *Wrist watch or stopwatch**

NOTE:

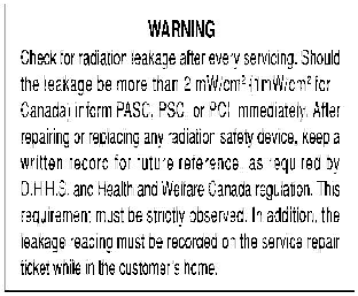
Check the line voltage under load.Low voltage will lower the magnetron output. Take the temperature readings and heating time as accurately as possible.

1. **Fill the beaker with exactly one liter of tap water.Stir the water using the thermometer and record the water's temperature. (recorded as T1).**
2. **Place the beaker on the center of glass tray. / Set the oven for High power and heat it for exactly one minute.**
3. **Stir the water again and read the temperature of the water. (recorded as T2).**
4. **The normal temperature rise at High power level for each model is as shown in table.**

TABLE (1L-1min.test)

RATED OUTPUT	TEMPERATURE RISE
1200W	Min. 18.5°F(10.3°C)
1300W	Min. 19.8°F(11.1°C)

3. PROCEDURE FOR MEASURING MICROWAVE ENERGY LEAKAGE



WARNING

Check for radiation leakage after every servicing. Should the leakage be more than 2 mW/cm² (1mW/cm² for Canada) inform PASC, PSC, or PCI immediately. After repairing or replacing any radiation safety device, keep a written record for future reference as required by D.H.H.S. and Health and Welfare Canada regulation. This requirement must be strictly observed. In addition, the leakage reading must be recorded on the service repair ticket while in the customer's home.

NOTE:

The U.S. Government standard is 5 mW/cm2 while in the customer's home. 2mW/cm2 stated here is our own voluntary standard. (1mW/cm2 for Canada)

3.1. Equipment

- Electromagnatic radiation monitor
- Glass thermometer 212°F or 100°C
- 600cc glass beaker

3.2. Procedure for measuring radiation leakage

Note before measuring.

- Do not exceed meter full scale deflection. Leakage monitor should initially be set to the highest scale.
- To prevent false readings the test probe should be held by the grip portion of the handle only and moved along the shaded area in Figure no faster than 1 inch/sec (2.5cm/sec).
- Leakage with the outer panel removed ..... less than 5mW/cm2.
- Leakage for a fully assembled oven with door normally closed ..... less than 2mW/cm 2 (1mW/cm 2 for Canada).
- Leakage for a fully assembled oven [Before the latch switch (primary) is interrupted] while pulling the door ..... less than 2mW/cm 2.

1. Pour 275 ± 15cc (9ozs± 1/2oz) of 20°C ± 5°C (68° ± 9°F) water in a beaker which is graduated to 600cc, and place in the center of the oven.
2. Set the radiation monitor to 2450MHz and use it following the manufacturer's recommended test procedure to assure correct results.
3. When measuring the leakage, always use the 2 inch (5cm) spacer

supplied with the probe.

4. Tap the start pad or set the timer and with the magnetron oscillating, measure the leakage by holding the probe perpendicular to the surface being measured.

3.2.1. Measurement with the outer panel removed.

Whenever you replace the magnetron, measure for radiation leakage before the outer panel is installed and after all necessary components are replaced or adjusted. Special care should be taken in measuring around the magnetron.

3.2.2. Measurements with a fully assembled oven.

After all components, including outer panel are fully assembled, measure for radiation leakage around the door periphery, the door viewing window, the exhaust opening, control panel and air inlet openings.

3.3. Record keeping and notification after measurement

- After any adjustment or repair to a microwave oven, a leakage reading must be taken. Record this leakage reading on the repair ticket even if it is zero.
  A copy of this repair ticket and the microwave leakage reading should be kept by repair facility.
- Should the radiation leakage be more than 2 mW/cm^2 (1mW/cm for Canada) after determining that all parts are in good condition, functioning properly, and genuine replacement parts as listed in this manual have been used, immediately notify PASC, PSC or PCI.

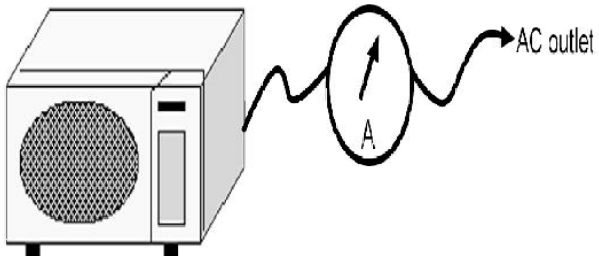
3.4. At least once a year, have the radiation monitor checked for calibration by its manufacturer.

4. SIMPLE WAY OF H.V. INVERTER/MAGNETRON

TROUBLESHOOTING

Purpose:
Simple way (3/23 seconds rule) of identifying whether it's Magnetron, Inverter, or others.

Set-up:
The unit under question is connected through the Ammeter as shown below.



Procedure:
Follow the matrix table below to identify the problem source.

Note:

Do not replace both Inverter board and Magnetron simultaneously and automatically without going through this procedure.

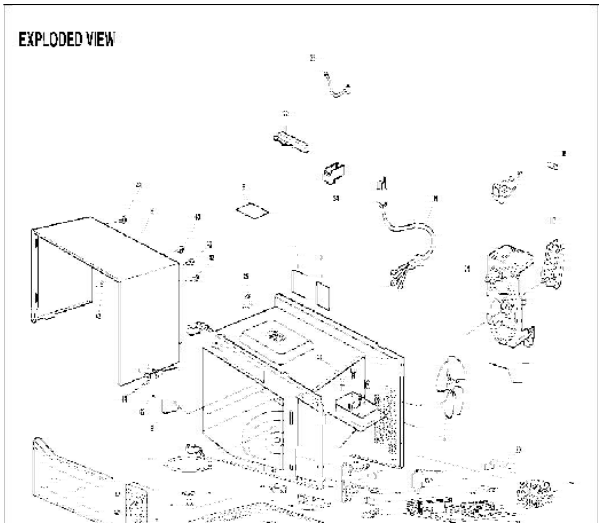
Power will:	Ammeter reading is:	To do:	Remedy:
Shut off in 23 seconds after "Start".	1. Between 0.5A and 1.0A.	Check and repair open magnetron circuit	Open magnetron wiring between Inverter and magnetron terminal.
	2. Between 1.0A and 2.0A.	Check continuity of D702 in Inverter PCB.	
		1. D702 shorted	Replace H.V.Inverter (F606Y6G00CP)
		2. D702 is OK	Replace magnetron
Shut off in 3 seconds after "Start"	1. Less than 0.5A	Check open circuit: Latch Switch, DPC, Power Relay and CN701	Replace defective component(s), or correct switch, cables and connectors.

5. H.V.INVERTER BOARD MAIN PARTS LIST (F606Y6G00CP)

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
C707		ECWH30822JUA	CAPACITOR	1	8200PF,3000VDC
C706		ECWH30562JUA	CAPACITOR	1	5600PF,3000VDC
D701,D702	⚠	B0FBAZ000001	DIODE SI	2	
DB701		B0FBBS000001	BRIDGE DIODE	1	20A,600V
L701		F50206G00AP	CHOKE COIL	1	
Q701		B1JAGV000008	TRANSISTOR SI	1	900V
T701		A609A6G00CP	H.V. TRANSFORMER	1	
C701		ECWF5324N310	CAPACITOR	1	
C702		ECWF2455N614	CAPACITOR	1	
D709		ERZV10D621CS	VARISTOR	1	

6. EXPLODED VIEW AND PARTS LIST

6.1. EXPLODED VIEW



6.2. PARTS LIST

NOTE:

1. When ordering replacement part(s), please use part number(s) shown in this part list.
Do not use description of the part.

2. Important safety notice:
Components identified by mark have special characteristics important for safety.
When replacing any of these components, use only manufacture's

specified parts.

NOTE:

“A” parts are supplied by CSD (Japan)

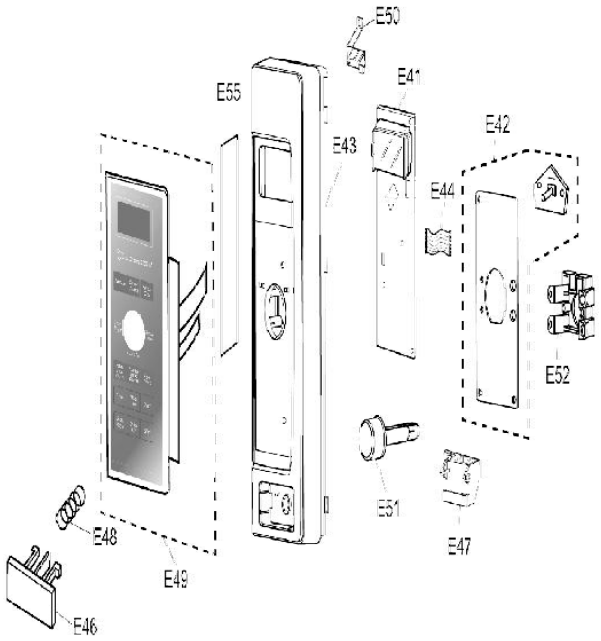
“F” parts are supplied by PHAMOS (China)

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
1		F00064W70AP	CAUTION LABEL	1	SD986S APH
1		F00069660AP	CAUTION LABEL	1	H965WFB APH
2		F00077B00HAP	NAME PLATE	1	H965WFB APH
3		F00338F00AP	FUSE LABEL	1	
4		F10016P40AP	BASE	1	
5		F10084T00AP	RUBBER FOOT	4	
6		F110D5W10SAP	CABINET BODY	1	SD986S APH
6		F110D5W20HAP	CABINET BODY	1	H965WFB APH
7	⚠	F200A8D00AP	OVEN	1	
8		F20555K00AP	COVER	1	
9		F21315Y00AP	PULLY SHAFT	1	
10		F2177-F80	WASHER	1	
11		F290D9330AP	ROLLER RING (U)	1	
12	⚠	F3020-1200	DOOR HOOK	1	
14		F3136-1200	HOOK LEVER A	1	
15		F31374650AP	HOOK LEVER B	1	
16		F31384650AP	HOOK LEVER C	1	
17		F400A5Y00AP	FAN MOTOR	1	AC120V,SINGLE PHASE,60Hz
18		F40084T00AP	FAN BLADE	1	
19		F40254W00AP	AIR GUIDE A	1	
20		F40264T60APG	AIR GUIDE B	1	
21		F41445W00AP	ORIFICE	1	
22		F64508660AP	SENSOR COVER B	1	
24		F65434W00AP	SENSOR COVER C	1	
25		A607S4M00AP	STEAM SENSOR	1	
26		F612E5Y30AP	INCANDESCENT LAMP (U)	1	
27	⚠	J61415G10XN	MICRO SWITCH	1	(PRIMARY LATCH SWITCH) (V-15G-3C25)
28	⚠	J61414T00AP	MICRO SWITCH	1	(SECONDARY LATCH SWITCH) (D3V-16G-3C25)
29	⚠	F61456N60AP	THERMAL CUTOUT	1	150°C/-20°C
31	⚠	F61785U30XN	MICRO SWITCH	1	(SHORT SWITCH) (D3V-1G-2C25)
32	--	F606Y6G00CP	H.V.INVERTER (U)	1	
33		F65856K50AP	INVERTER BRACKET	1	
34		2M261-M32KLY	MAGNETRON	1	
35		F62308F00AP	FUSE	1	20A
37		F692Y8A00AP	NOISE FILTER	1	
38		F63265G60AP	TURNTABLE MOTOR	1	
39		F900C4T60CP	AC CORD W/PLUG	1	SD986S APH
39		F900C4T00AP	AC CORD W/PLUG	1	H965WFB APH
40		F66626G10AP	GROUNDING PLATE	1	
41		XTWFA4+12T	SCREW	4	FOR MAGNETRON
42		F90804W00AP	CANOE CLIP	1	FOR COVER
43		XTTANE4T12A0	SCREW	5	FOR CABINET BODY
44		XTTFA4+6BN	SCREW	2	FOR CABINET BODY SIDE
47		F03347B60AP	MENU LABEL	1	SD986S APH
47		F03347D60AP	MENU LABEL	1	H965WFB APH
48		F82574U00AP	DOOR OPENING BRACKET	1	SD986S APH

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
48		F82575W00AP	DOOR OPENING BRACKET	1	H965WFB APH
49		F04467D00AP	FUNCTION LABEL	1	SD986S APH
51		F11406G00AP	LEVER STOPPER	1	H965WFB APH

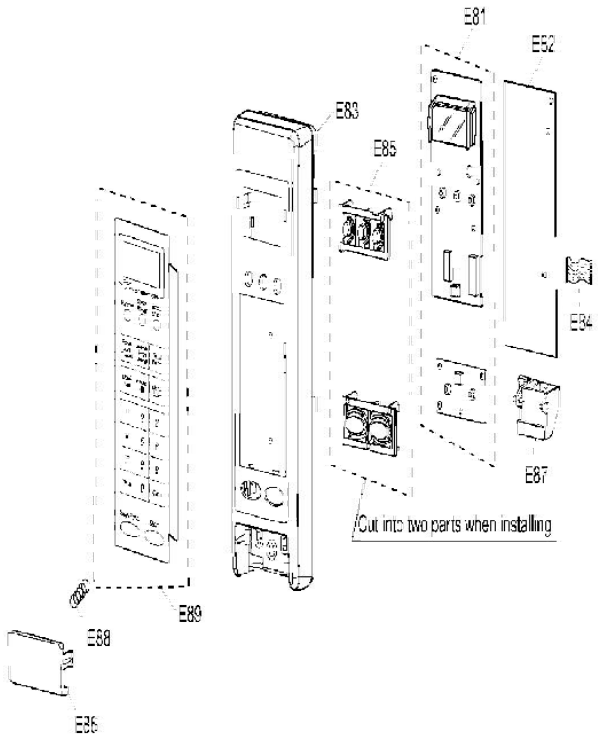
6.3. ESCUTCHEON BASE ASSEMBLY

6.3.1. NN-SD986S APH



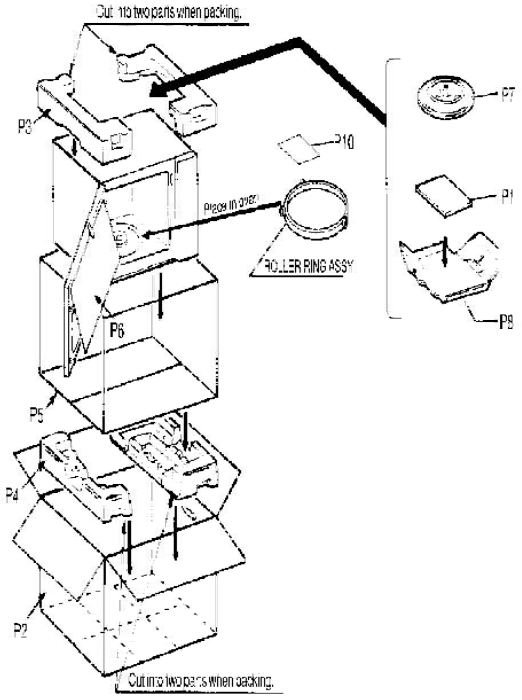
Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
E41		F603L7A10AP	D.P.CIRCUIT (AU)	1	SD986S APH
E42		F603Y7A10AP	D.P.CIRCUIT (DU)	1	SD986S APH
E43		F800L8D10SAP	ESCUTCHEON BASE (U)	1	SD986S APH
E44		F66167D00AP	FLAT CABLE	1	SD986S APH
E46		F80724M60SCP	DOOR OPENING BUTTON	1	SD986S APH
E47		F82564M60AP	DOOR OPENING LEVER	1	SD986S APH
E48		F80375K00AP	COOK BUTTON SPRING	1	
E49		F630Y7A10SAP	MEMBRANE SWITCH (U)	1	SD986S APH
E50		F90095X00AP	GROUNDING PANEL	1	SD986S APH
E51		F803G7D00BAP	POP-UP DIAL (U)	1	SD986S APH
E52		F80187D00BAP	BACKSTOP	1	SD986S APH
E55		F00078D10SAP	NAME PLATE	1	SD986S APH

6.3.2. NN-H965WFB APH



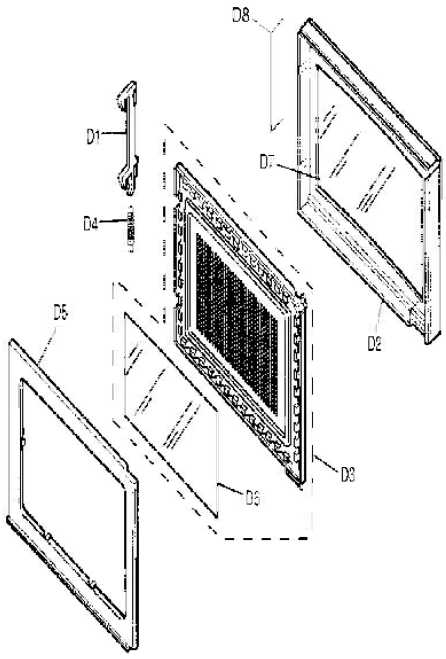
Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
E81		F603L7B00AP	D.P.CIRCUIT (AU)	1	H965WFB APH
E82		F603Y5W00AP	D.P.CIRCUIT (DU)	1	H965WFB APH
E83		F80347B00HAP	ESCUTCHEON BASE	1	H965WFB APH
E84		F66164W20AP	FLAT CABLE	1	H965WFB APH
E85		F82987D60KAP	BUTTON	1	H965WFB APH
E86		F80726G40HAP	DOOR OPENING BUTTON	1	H965WFB APH
E87		F82565W00AP	DOOR OPENING LEVER	1	H965WFB APH
E88		F80375K00AP	COOK BUTTON SPRING	1	
E89		F630Y7B00HAP	MEMBRANE SWITCH (U)	1	H965WFB APH

6.4. PACKING AND ACCESSORIES



Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
P1		F00037D00AP	INSTRUCTION MANUAL	1	SD986S APH
P1		F00037C50AP	INSTRUCTION MANUAL	1	H965WFB APH
P2		F01028D10SAP	PACKING CASE,PAPER	1	SD986S APH
P2		F01027B00HAP	PACKING CASE,PAPER	1	H965WFB APH
P3		F01044W00AP	UPPER FILLER	1	SD986S APH
P3		F01045J00AP	UPPER FILLER	1	H965WFB APH
P4		F01054W00AP	LOWER FILLER	1	SD986S APH
P4		F01055J00AP	LOWER FILLER	1	H965WFB APH
P5		F01067C50AP	P.E.BAG	1	SD986S APH
P5		F01064W00AP	P.E.BAG	1	H965WFB APH
P6		F01074U00AP	DOOR SHEET	1	
P7		A06014M00AP	COOKING TRAY	1	
P8		F01084M00AP	TRAY PACKING	1	
P10		F00065G40AP	CAUTION LABEL	1	

6.5. DOOR ASSEMBLY



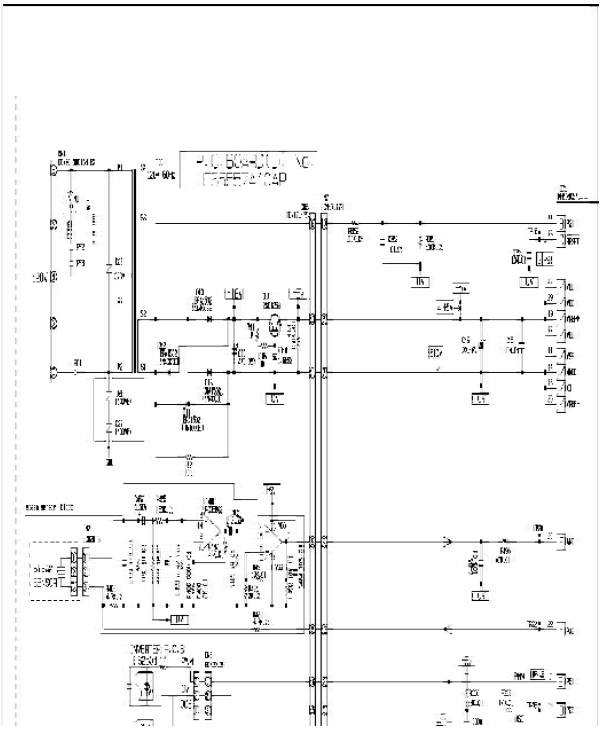
Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
D1		F3018-1200	DOOR KEY A	1	
D2		F301A8D10SAP	DOOR A (U)	1	SD986S APH
D2		F30016G40HAP	DOOR A	1	H965WFB APH
D3		F302K4U00AP	DOOR E (U)	1	
D4		F30215G10XN	DOOR KEY SPRING	1	
D5		F30854U00AP	DOOR C	1	
D6		F31454U00AP	DOOR SCREEN A	1	
D7		F31467B00HAP	DOOR SCREEN B	1	H965WFB APH
D8		F02459660AP	DHHS LABEL	1	SD986S APH

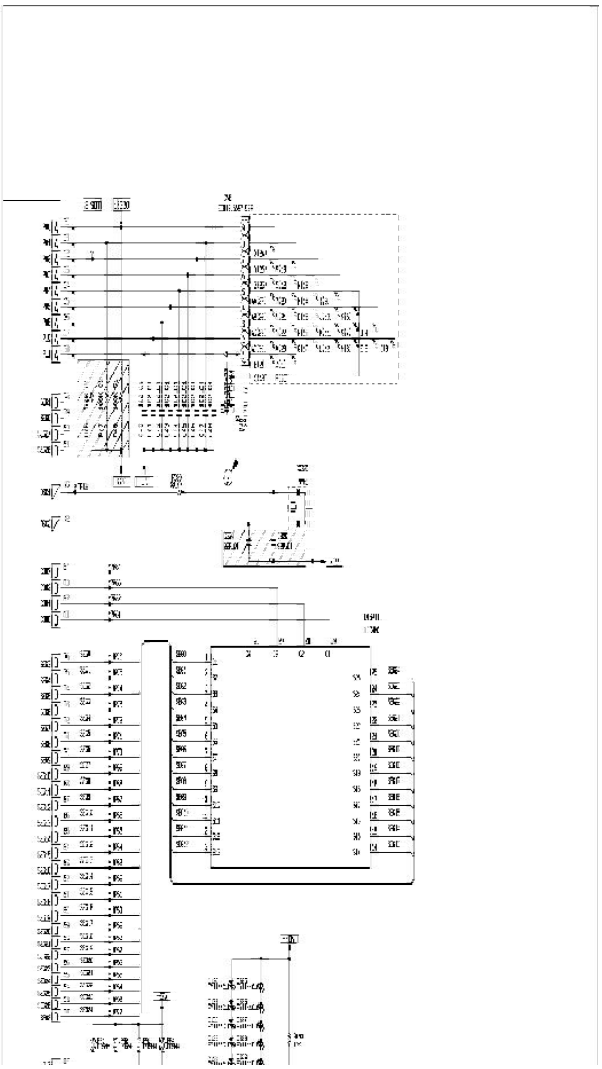
6.6. WIRING MATERIALS

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
W1		F030A7B70AP	LEAD WIRE HARNESS	1	APH
W2		F030E6G30AP	H.V.LEAD WIRE	1	
W3		F03537B70AP	LEAD WIRE HARNESS(U)	1	(INCLUDING THERMISTOR)

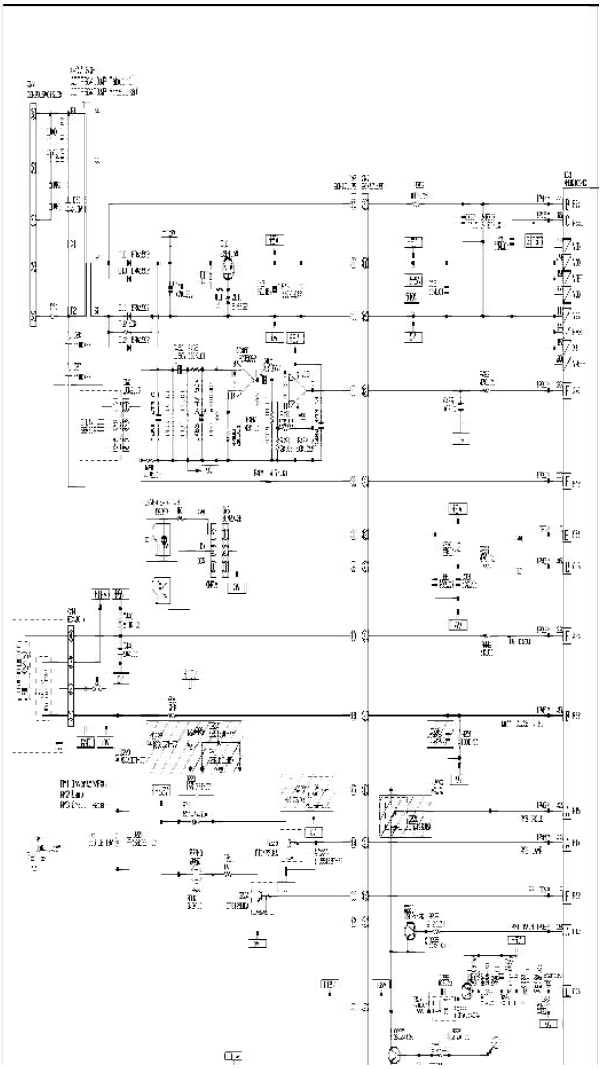
7. DIGITAL PROGRAMMER CIRCUIT

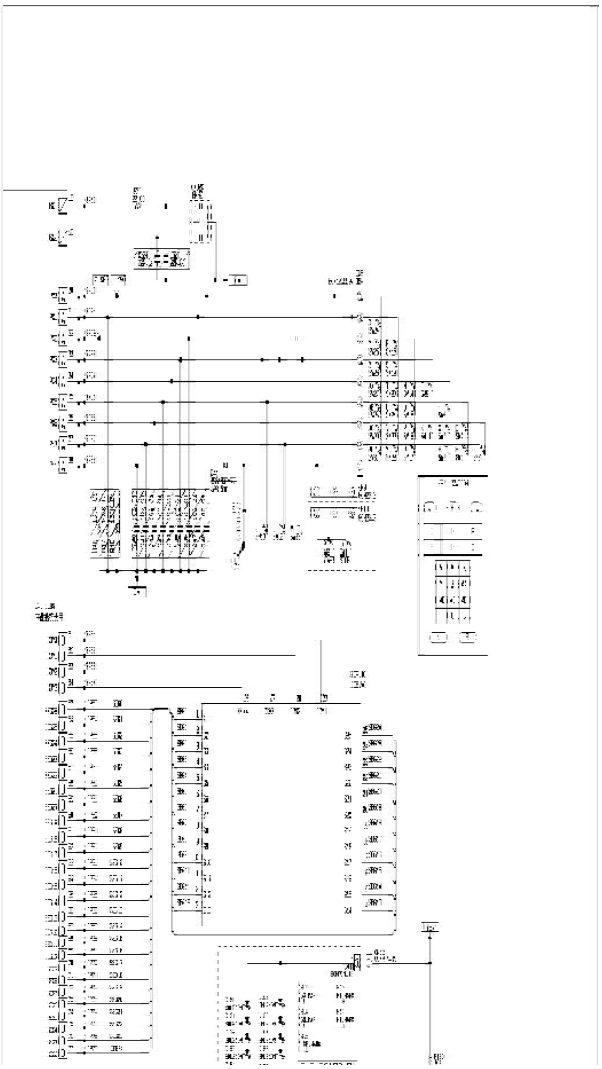
7.1. NN-SD986S APH





7.2. NN-H965WFB APH





7.3. PARTS LIST

7.3.1. NN-SD986S APH

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
BZ310		L0DDEA000014	BUZZER	1	2.0KHz
C10		AECETK1V471B	AL CHEM CAPACITOR	1	470 F/35V
C16		AECETS1C220B	AL CHEM CAPACITOR	1	22 F/16V
C482		AECETS1H010B	AL CHEM CAPACITOR	1	1 F/50V
C483		AECETS1HR47B	AL CHEM CAPACITOR	1	0.47 F/50V
C485		AECETS1H2R2B	AL CHEM CAPACITOR	1	2.2 F/16V
C481		F1H1H473A897	CHIP CAPACITOR	1	0.047 F/25V
C15,C223,C350,C441		F1H1E104A108	CHIP CAPACITOR	4	0.1 F/25V
C220,C221		F1H1A105A068	CHIP CAPACITOR	2	1 F/10V
C330,C331		F1H1H102A896	CHIP CAPACITOR	2	0.01 F/50V
C352		F1H1H101A894	CHIP CAPACITOR	1	100PF/50V
C40-C48		F1H1H102A896	CHIP CAPACITOR	9	0.01 F/50V
C441		F1H1E104A108	CHIP CAPACITOR	1	0.1 F/25V
C80,C81,C222,C228,C484,C486		F1H1H103A897	CHIP CAPACITOR	6	0.01 F/50V
CN1		K1KA03AA0115	CONNECTOR	1	
CN2		K1KA03A00300	CONNECTOR	1	3 Pin
CN4		K1KA04AA0086	CONNECTOR	1	
CN6		K1MN17A00001	CONNECTOR	1	17 Pin
CN7		K1MN17B00053	CONNECTOR	1	17 Pin
CN8		K1MN09BA0072	CONNECTOR	1	
CX320		EFOEC8004A4	CERAMIC RESONATOR	1	8.0MHz
DISP1		L5AAAFD00019	LCD	1	
DISP1 HOLDER		F66175E40XN	LCD HOLDER	1	
		F67525E40XN	DIFFUSION SHEET	1	
D10,D11,D12,D13		B0EAKT000025	DIODE	4	
D40,D220-D223,D227		B0AACK000004	DIODE	6	
D180-D189		B3ACB0000065	CHIP-LED	10	
IC1		MN101C54CFY1	L.S.I.	1	
Q10,Q180		B1BAAJ000003	TRANSISTOR	2	
Q181,Q220,Q225		B1ABCF000010	CHIP TRANSISTOR	3	
Q221		B1ADCF000003	CHIP TRANSISTOR	1	
Q182,Q210,Q223		B1GBCFEL0002	CHIP DIGI-TRANSISTOR	3	
Q222		B1GDCFJJ0002	CHIP DIGI-TRANSISTOR	1	
R11,R16,R311		D0AE102JA155	CARBON RESISTOR	3	1K,1/4W,5%
R12		D0AE103JA155	CARBON RESISTOR	1	10K,1/4W,5%
R290		D0AE104JA155	CARBON RESISTOR	1	100K,1/4W,5%
D25		AERZ271KSBN	ZENER RESISTOR	1	270V
RY1		AEBGJQC25F18	POWER RELAY	1	
RY2		K6B1AZA00011	POWER RELAY	1	
T10		G4C2AAD00006	LOW VOLTAGE TRANSFORMER	1	120V
VZ1		D3CA6103A017	VARISTOR	1	
ZD10		B0BA5RR00016	ZENER DIODE	1	

7.3.2. NN-H965WFB APH

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
BZ310		L0DDEA000014	BUZZER	1	2.0KHz
C10		AECETK1V471B	AL CHEM CAPACITOR	1	470 F/35V
C13		AECETS1C220B	AL CHEM CAPACITOR	1	22 F/16V
C482		AECETS1H010B	AL CHEM CAPACITOR	1	1 F/50V
C483		AECETS1HR47B	AL CHEM CAPACITOR	1	0.47 F/50V
C485		AECETS1H2R2B	AL CHEM CAPACITOR	1	2.2 F/50V
C352		F1H1H101A894	CHIP CAPACITOR	1	100PF/50V
C330,C331		F1H1H102A896	CHIP CAPACITOR	2	1000PF/50V
C222,C484,C486		F1H1H103A897	CHIP CAPACITOR	3	0.01 F/50V
C481		F1H1H473A897	CHIP CAPACITOR	1	0.047 F/50V
C15,C223,C350,C440		F1H1E104A108	CHIP CAPACITOR	4	0.1 F/25V
C220,C221		F1H1A105A068	CHIP CAPACITOR	2	1 F/10V
CN2		K1KA03A00300	CONNECTOR	1	3 Pin
CN3		K1KA03AA0115	CONNECTOR	1	
CN3		F03526P40AG	INV. HARNESS (U)	1	
CN4		AEEMXH00F04W	CONNECTOR	1	
CN6		K1MN15A00045	CONNECTOR	1	
CN7		K1MN15B00083	CONNECTOR	1	15Pin
CN8		K1MN09BA0072	CONNECTOR	1	
CN9,CN10		F03547B40AP	CONNECTOR	2	3 Pin
CN13,CN14		K4CE01000003	PIN	2	
CX320		EFOEC8004A4	CERAMIC RESONATOR	1	8MHz
IC1		MN101C54CFP	L.S.I.	1	
IC480		C0AABA000051	IC	1	
DISP110		L5AAAFD00022	LCD	1	
DISPL1		F66175E40XN	LCD HOLDER	1	
Q10,Q180		B1BAAJ000003	TRANSISTOR	2	
Q181,Q220,Q225		B1ABCF000010	CHIP TRANSISTOR	3	
Q221		B1ADCF000003	CHIP TRANSISTOR	1	
Q222		B1GDCFJJ0002	CHIP DIGI-TRANSISTOR	1	
Q182,Q223,Q224		B1GBCFEL0002	CHIP DIGI-TRANSISTOR	3	
D180-D189		AESQPY1112CK	CHIP-LED	10	
D40,D220,D221,D223,D225,D227		B0AACK000004	DIODE	6	
D10,D11,D12,D13		B0EAKT000025	DIODE	4	
D25		AERZ271KD10A	VARISTOR	1	270V
D26,D27		AERZ102KD10A	VARISTOR	2	1100V(CPH)
R10,R11,R311		D0AE102JA155	CARBON FILM RESISTOR	3	1K ,1/4W,5%
R180		D0AE103JA155	CARBON FILM RESISTOR	1	10K ,1/4W,5%
R290		D0AE104JA155	CARBON FILM RESISTOR	1	100K,1/4W,5%
ZD10		AESZMTZJ5R6B	ZENER DIODE	1	
RY1		AEBGJQC25F18	POWER RELAY	1	
RY2		AEBLD118	POWER RELAY	1	
T10		G4C2AAD00006	LOW VOLTAGE TRANSFORMER	1	120V
VZ340		D3CA6103A017	VARISTOR	1	10K
SW1,SW2,SW10,SW12,SW13		EVQ11L05R	SWITCH	5	